WHAT IS CLAIMED IS:

1.   An apparatus of converting a series of data word into a modulated signal, comprising:

a generator generating for each data word a number of alternative sequences by combining mutually different digital words with the data word;

a first calculator calculating a digital sum value for each alternative sequence;

a second calculator calculating for each alternative sequence a penalty based on respective consecutive-zeros sections; and

a selector selecting one alternative sequence for recording onto a recordable medium based on the calculated digital sum values and penalties.

2.   The apparatus of claim 1, wherein said generator comprises:

an augmentor generating for each data word 2^N intermediate sequences by combining the N-bit digital words with the data word; and

a coder conducting NRZI coding for each generated intermediate sequence to produce the 2^N alternative sequences.

3.   The apparatus of claim 1, wherein said second calculator calculates the penalty in further consideration of joining consecutive zeros between each alternative sequence and a previously-selected sequence by said selector.

4.   The apparatus of claim 1, wherein said second calculator, for each alternative sequence, counts respective consecutive-zeros sections, compares each count with a plurality of different references, multiplies each count by a weighting factor determined from the comparison, and sums the multiplied results altogether to produce said penalty.

5.   The apparatus of claim 1, wherein said selector selects one alternative sequence with the smallest sum of the calculated digital sum value and the calculated penalty among the generated plural alternative sequences to record onto a recordable medium.

6.   A method of converting a series of data word into a modulated signal, comprising the steps of:

(a) generating for each data word a number of alternative sequences by combining mutually different digital words with the data word;

(b) calculating, for each alternative sequence, a digital sum value and a penalty based on respective consecutive-zeros sections; and

(c) selecting one alternative sequence for recording onto a recordable medium based on the calculated digital sum values and penalties.

7.   The method of claim 6, wherein said step (a) generates for each data word 2^N intermediate sequences by combining the N-bit digital words with the data word, and conducts NRZI coding for each generated

intermediate sequence to produce the 2^N alternative sequences.

8.   The method of claim 6, wherein said step (b) calculates the penalty in further consideration of joining consecutive zeros between each alternative sequence and a previously-selected sequence by said step (c).

9.   The method of claim 6, wherein said step (b), for each alternative sequence, counts respective consecutive-zeros sections, compares each count with a plurality of different references, multiplies each count by a weighting factor determined from the comparison, and sums the multiplied results altogether to produce said penalty.

10.   The method of claim 6, wherein said step (c) selects one alternative sequence with the smallest sum of the calculated digital sum value and the calculated penalty among the generated plural alternative sequences to record onto a recordable medium.

11.   A recording medium, including at least one sequence that has been recorded thereon through the following steps of:

generating for each data word a number of alternative sequences by combining mutually different digital words with the data word;

calculating, for each alternative sequence, a digital sum value and a penalty based on respective consecutive-zeros sections; and

selecting one alternative sequence for recording onto a recordable

medium based on the calculated digital sum values and penalties.